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## Cover Crops Cover Crops In Citrus Groves

By E. F. DeBUSK, Citriculturist

The cover-crop is a very important factor in citrus fruit production. In fact, profits and successful fruit production often depend upon proper utilization of the cover-crop in the grove management program.

Let's have a definite understanding of what is meant by the cover-crop in a citrus grove. It is a kind of extra crop grown in among the citrus trees and may consist of any of the native grasses or weeds or it may be a planted crop such as crotalaria, beggarweed, cowpeas or any other crop commonly planted. I mention this because a few growers overlook the fact that the native cover crops that come spontaneously are not really the kind of cover crop to which we refer and have little or no value. This is a mistake. Quite a few growers have been guilty of plowing up a luxuriant growth of grasses and weeds and planting some crop not very well adapted, the sum total of which resulted in the production of less organic matter by the end of the season than would have been produced had the natural crop been left to grow.

It might be well to again call attention to some of the functions of a cover crop in a citrus grove. We might mention first the production of organic matter. We cannot grow citrus fruit successfully without an ample supply of organic matter in the soil. This function of a cover crop suggests that the first thing to consider in planting the crop is to

grow the crop that will produce the greatest amount of vegetable matter per acre and at the same time fit into the grove management program. There was a time when we laid particular stress on the growing of a legume cover crop because by so doing free nitrogen could be fixed in the soil and thereby reduce the nitrogen cost in fertilizing the main crop. But in view of the fact that nitrogen is very cheap at the present time we find it desirable to lay stress upon the growing of crops primarily for the supply of organic matter. Some objection is raised to the growing of a cover crop that produces coarse woody growth because it is somewhat difficult to handle such material in the grove. There is no real objection to such material. In fact, in the case of a light crop such material will last longer and give a more continuous supply of decaying organic matter throughout the season until a new crop can be produced. It has been noted, for instance, that a crop of cowpeas disked into the soil is very largely decomposed by midwinter. Whereas a crop of grass, large weeds or crotalaria may last well into the summer. It should be clearly understood that decaying organic matter is the only source of food or energy supply for the soil organisms so necessary in the proper utilization of applied fertilizers and in the growth of trees and production of fruit.

Another function of the grove cover-crop is that of utilizing nitrate

nitrogen and other leachable plant food elements during the rainy season. By taking advantage of the surplus of water, these leachable elements are converted into a very desirable organic form by the growth of the cover crop. This is returned to the soil and to the trees when the cover crop material decomposes. In addition to returning to the soil the plant food elements utilized in growing the cover crop, the organic matter acts as a balance wheel in the soil by making more available the various plant food elements in the soil and applied in fertilizers by increasing the solvent power of the soil water by the humic acids produced through the decomposition of the vegetable material.

Still another very important function of a grove cover-crop is that of shading the soil and thereby keeping down its temperature during the hot season. It has been found that the temperature of the first inch or two of the unshaded soils in our citrus groves has run as high as 135 degrees Fahrenheit. It is known that tree roots cannot function in a soil whose temperature is above 98. It has also been found that the temperature of the soil can be reduced 7 to 15 degrees by shading it with a cover crop or light mulching of vegetable matter. Some objections have been raised to having a grass cover-crop in competition with the roots of the citrus trees. This is really an advance-

(Continued on page 9)

# ESSENTIAL PLANT FOODS

## PHOSPHORUS AND POTASSIUM, SOURCES AND FUNCTIONS

By CHAS. E. BELL

You have been told that nitrogen, phosphorus and potassium are termed the major, essential elements for plant foods and appear to be the ones most commonly lacking in the soil. We shall discuss here the elements phosphorus and potassium.

The sources from which these elements are derived are varied. Both phosphorus and potassium are always found in combination with other elements to form chemical compounds. These compounds are found as natural deposits in the surface of the earth. You are familiar with the extensive phosphate deposits here in Florida, but the Florida deposits are small compared to those of the northwestern states of Wyoming, Utah and Montana. Tennessee has phosphate deposits which are claimed to be as rich in phosphorus as our own. America is not the only nation in which phosphate deposits are found. It is claimed Russia has one of the largest phosphate deposits in the world. Phosphorus is found in nature in combination with calcium and oxygen to form calcium phosphate. As phosphorus is a constituent of all animal and vegetable life, much phosphorus is also found in great accumulations of these materials.

Calcium phosphate is the principal material from which most commercial phosphatic fertilizers are made, the major product being superphosphate. This product is made by treating calcium phosphate with a definite proportion of sulfuric acid. Enough acid is added to convert the phosphorus into an available form, yet leaves the finished product non-acid forming when added to the soil. Although much of the superphosphate after being added to the soil reverts to a form insoluble in water, it is what is known as citrate soluble, and in this form it is readily available to the plant.

Several forms of phosphatic fertilizers other than superphosphate are being placed on the market today, some of these being raw and steamed bone meal, rock phosphate, colloidal phosphate, double and triple superphosphate, basic slag and guano. The greater percentage of the phosphorus in superphosphate, double superphosphate, triple superphosphate and basic slag is available to the plant when

added to the soil although some may not be soluble in water. Although tankage and fish scrap are sold on a basis of their nitrogen content, these materials contain considerable phosphorous.

Plants absorb phosphorous for the most part in the form of phosphates, although they may in some instances utilize some organic phosphorous, such as nucleic acid, cabbage, rape and sweet clover may utilize some phosphorous or phosphate rock while corn, oats and barley do not utilize as much from this material. Truog believes that plants containing a relatively high amount of calcium have a relatively high feeding power for the phosphorous of phosphate rock and plants of relatively low calcium content have a relatively low feeding power for the phosphorous of phosphate rock.

Phosphorous is above all necessary for the formation of lecithin, the nucleo proteins, and nucleic acid which are present in practically every living plant cell. The application of phosphorous promotes root formation, especially lateral and fibrous roots. This rapid growth of roots causes them to grow deeper into the soil. This behavior is beneficial under drought conditions and in poor soils for it increases the feeding zone of the plant. Phosphorous is beneficial to root crops like turnips, potatoes and rutabagas. Applications of phosphorous appear to induce earlier ripening of grain crops grown on soil low in this element. The more soluble forms of phosphorous hasten maturity more than the less soluble, which could be expected, as the plants naturally would absorb readily the most soluble forms of phosphorous. This would cause an earlier utilization of the phosphorus in the metabolism of the plant.

Almost every nation has natural sources of potassium in some form. These sources may be natural deposits in the form of potash salts or a by-product of some industry. At present, Germany and France appear to have the most extensive deposits. Germany has deposits of mineral potash sufficient to supply the needs of that country for centuries. At the end of the World War, France acquired potash deposits in Alsace suf-

ficient to supply her needs for hundreds of years.

The World War ushered in a period of great activity for the production of potash on a national basis so that each nation could have an independent supply of this commodity in times of National distress. Probably few of us know that the United States many years ago was an exporter of potash instead of an importer as she now is.

The source of potash for export in the "past" was wood ashes, and started in Jamestown, Va., in 1608. This is an interesting historical fact.

The principal potential sources of potash in the United States today are made up of five units: first, Searles Lake, Cal.; second, Carlsbad region No. 1 of New Mexico; third, Carlsbad region No. 2 of New Mexico; fourth by-product of alcohol from can molasses; fifth, recovery from cement kiln fume. With the discovery of large deposits in New Mexico, the hope of discovering within our own borders deposits of water-soluble potash comparable to Europe was realized.

The world potash fertilizer production for 1924 totaled 2,000,000 metric tons. Of this amount, the German-French-Polish potash syndicates accounted for 1,560,000 metric tons. The remaining 440,000 tons were distributed among the United States, Spain, Palestine, Russia, and other nations.

Kelp, hardwood ashes, tobacco stems, and beet pulp furnished some of our potash but the supply from these materials is very limited.

Before many of these crude forms of potassic minerals and compounds are placed on the market as commercial fertilizers they are carried through a process of purification and undergo certain chemical changes to form definite chemical compounds. There are several compounds of potassium on the market today, such as potassium carbonate, kainit, manure salt, potassium nitrate and potassium ammonium nitrate, potassium phosphate chloride, commonly known as muriate of potash. All potassium in these materials is soluble in water, therefore it is immediately available to the plant.

(Continued on page 18)



# The Citrus Industry

with which is merged The Citrus Leaf

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## NO INSPECTION; NO CONTROL

Just as this issue of The Citrus Industry goes to press, word comes from Tallahassee that Attorney General Landis has advised Commissioner Mayo that he has no authority to proceed with inspection service for citrus fruits until the new state Citrus Control Commission has been appointed and has promulgated its regulations for the inspection and control of shipments.

This opinion of the Attorney General creates the anomalous condition of Florida having the most stringent control legislation ever enacted in this, or probably in any other state, and yet the grower having absolutely no protection against the shipment of unripe fruit. Until the Citrus Control Commission has been named by the Governor and until its regulations have been formulated and promulgated there appears to be absolutely no bar to the shipment of any or all fruit which the shipper may see fit to send to market.

The Governor is due to return to Tallahassee on September third. In view of the situation existing, there should be no delay in the appointment of the "eleven honest men" whom he has been seeking for membership on the Commission. In the meantime, growers and shippers who desire to protect the industry from the indiscriminate shipment of unripe fruit should take whatever steps may be possible to protect themselves and the industry from the disastrous effects of the early shipment of immature fruit which in past years has cost the growers and the industry untold loss on later shipments.

Just what steps it may be possible to take in this emergency is problematical. It is stated that a meeting of growers may be called at an early date to devise means for their own protection against shipments of the "early bird" variety. If and when such a meeting is held, it should be attended by every grower who has his own interest and the interests of the industry at heart, and a united front should be presented

in support of any program which may be adopted to protect the industry until the Control Commission is named and its operations become effective.

## WEATHER BUREAU TO GIVE FURTHER AID TO GROWERS

The new crop protection service for Florida growers authorized by the federal government and financed by federal and state funds, will soon be in operation, and should prove of great benefit to Florida citrus growers by supplying adequate advance information of probable frosts.

The service is to be in charge of E. S. Ellison who comes to Florida from California, where he has been connected with the frost protection service for some years. He will be aided by four or five assistants and will set up observation stations at various strategic points throughout the citrus belt, with his own headquarters at some convenient and centrally located point.

The service will begin the first of November and will continue until the latter part of March, covering the period of possible frost visitations in the citrus and trucking sections of the state.

Weather forecasts will be issued daily at noon, and in case of threatened frost later forecasts will be issued as required.

Studies also will be made to ascertain at what degree of cold different varieties of fruits and vegetables may be expected to suffer injury. Daily temperature readings at various points in the "belt" will be carefully studied and a great deal of experimental work will be carried on during the first year, for use in future work of the frost prediction bureau.

Florida growers have long sought the establishment of such a service, and following the freeze of last winter, the demand became so great that our representatives in the House and Senate at Washington took up the fight on behalf of the growers and succeeded in securing authority for the service.

## RURAL ELECTRIFICATION

While citrus growers are probably better equipped with electrical service than other rural dwellers, there are still many rural homes in the citrus belt which are in need of electrical equipment and whose owners will doubtless be interested in the plans of the Electric Home and Farm Authority, whose aim it is to extend rural electrification facilities to the largest possible number of farm homes.

For this reason, The Citrus Industry elsewhere in this issue prints an outline of the work planned by the Authority, in order that its readers may become conversant with the projected work and be able to make application for such equipment as they may require.

Florida grapefruit canning plants are said to have used 40 per cent of last year's grapefruit crop. It is further stated that only 20 per cent of their product is still unsold. These figures, if correct, indicate that the pack was by far the largest yet made and that the sales likewise have set a new record.

# The New Fertilizer Plan

By R. W. RUPRECHT

As many of you probably know a new fertilizer control or inspection law was finally passed on the last day of the legislative session. The new law makes a number of changes which should be of interest to all users of fertilizer.

Probably the most radical change is that requiring the guarantee of nitrogen as nitrogen instead of as ammonia. This change makes our law conform with the laws in most other states. The growers will have to learn that 1% of nitrogen is the same as approximately 1 1/4% of ammonia. Or in other words a 4% nitrogen fertilizer has the same amount of nitrogen as a 5% ammonia fertilizer. Whether or not the fertilizer companies are going to change all their formulas remains to be seen. As the law states that the guarantee of nitrogen, phosphoric acid and potash can only be stated in whole numbers, it will be impossible to have exactly the same percentage of nitrogen in the formulas as heretofore. However, this should not cause any concern for the use of a little more nitrogen will, in the majority of cases, prove beneficial rather than otherwise.

The second most important change is the requirement of stating the different forms of nitrogen in the fertilizer. The fertilizer tags of the future will show the total nitrogen present, the nitrate nitrogen, ammoniacal nitrogen, water soluble organic nitrogen and water insoluble nitrogen. Just what do these different forms of nitrogen mean? Let us take them up in the order in which they appear on the tag. The first line, total nitrogen, hardly needs any explanation. Next we find nitrate nitrogen. This is the form of nitrogen found in nitrate of soda, calcium nitrate, nitrate of potash and in small amounts in Peruvian Guano. It has always been considered the most quickly available form of nitrogen for plant use. It is also the most soluble and therefore the form most quickly leached from the soil through rainfall. The next line gives the ammoniacal form of nitrogen. The chief source of this form is sulfate of ammonia, others being anhydrous ammonia and ammonium phosphate; small amounts are also found in Peruvian Guano and in the high grade organic ammoniates. The ammoniacal form of nitrogen has generally been

considered a little more slowly available for plants than the nitrate form. However, more recent studies have indicated that for some plants and under certain conditions this form is equal in availability to the nitrate form. In general it will not leach out quite so readily from the soil as will the nitrates. These two classes of nitrogen, nitrates and ammoniacal, can in general be considered as constituting the inorganic nitrogen in fertilizer.

Next we come to the water soluble organic nitrogen. This includes that class of organic compounds which while chemically classed as organic are more nearly like the inorganic forms of nitrogen in regard to plant nutrition. They are almost as rapidly available as the ammoniacal form but do not leach quite so rapidly. They are also called the synthetic organic compounds, the most widely known being urea and cyanamid.

The last form of nitrogen is the water insoluble nitrogen. This class includes all of the natural organics, such as the tankages, blood, cottonseed meal, castor pomace, tobacco stems, etc. As is indicated they are not soluble in water and thus not immediately available having to be acted upon by the soil bacteria to change their nitrogen into soluble form. However, as was mentioned previously all of the higher grade organics besides containing these insoluble forms of nitrogen also contain some of the soluble forms such as nitrates, ammoniates or water soluble organic forms. Therefore the percent of nitrogen found under this heading will not truly indicate how much of these high class organics were used in the fertilizer but only that part which is slowly available. The high rating that the high grade organics, notably Peruvian Guano, have had has been because they contained all four forms of nitrogen thus furnishing the plants with a continuous supply of nitrogen. Therefore users of mixed fertilizer must take this fact into consideration when they study the nitrogen analyses given on the tag. For example, suppose a grower orders a fertilizer and states he wants a 2% of the nitrogen from guano or high-grade tankage or dried blood. When he gets the fertilizer and looks at the tag the water insoluble nitrogen figure instead of being 2% will be less than that. This does

not mean that the manufacturer did not comply with the grower's request but indicates that part of the nitrogen in the organic material was water soluble. In the future therefore, if you wish to have a definite percentage of slowly available nitrogen you will have to specify that you want, say 2% of water insoluble nitrogen rather than 2% of nitrogen from high grade tankage.

In general the inorganic forms of nitrogen are the cheapest, the synthetic organic compounds next in price and the true organics highest in price.

No changes were made in the phosphoric acid and potash guarantee.

Another new requirement under this law is the statement as to whether the fertilizer is acid-forming or non acid-forming. This does not mean that the fertilizer as received is acid or not acid but refers to the final result of the use of such a fertilizer on the soil. As the writer has said on several occasions, this question of acid-forming or non acid-forming fertilizers is of less importance in the state than in some other states. At the present time we have only meager local data on the effect of various fertilizer materials on soil acidity. Results we have seem to indicate that data obtained in other sections of the country do not apply when the materials are used on our light sandy soils. In general, however, the use of non acid-forming fertilizer should be encouraged especially on the light sandy soils of the ridge section, not so much because of its non acid-forming properties as because practically all non acid-forming fertilizer contains dolomite or some other filler that has a greater value than sand. On the alkaline soils, as found on the lower east coast, the acid-forming fertilizers should be used. It must be clearly understood that the use of non acid-forming fertilizer will not take the place of lime or liming materials where the soil is excessively acid.

We now come to the last major change in the present law over the old law. This is the requirement of the guarantee of secondary plant foods if they are claimed to be present. In secondary plant foods are included all elements except nitrogen, phosphoric acid, potash and chlorine. Here I think our legislators made a mistake. The law states that the



minimum percentage should be stated. You growers should be just as much and in many cases more interested in the maximum content of some of these elements. Many of the minor or secondary elements are very decidedly toxic if used in too large amounts, and unless you know the maximum amount of these elements present in the fertilizer you cannot tell how much you may be adding to your soil. As I see it, you would have no redress under this law should a fertilizer manufacturer add more of these elements to his fertilizer than the minimum guaranteed and you ruined your crop because you assumed the guaranteed amount was all that was present. Another point should be emphasized and that is just because a manufacturer does not show a guarantee of secondary plant foods does not mean that none are present in the fertilizer. Except for the synthetic fertilizers, and even some of these contain them, there is not a fertilizer on the market that does not contain other elements besides the three: nitrogen, phosphoric acid and potash usually thought of when we think and speak of fertilizers. It is a safe prediction to make that when you buy ordinary commercial fertilizer you will get considerable amounts of calcium and sulfur plus smaller amounts of numerous other elements in addition to nitrogen, phosphoric acid and potash. Personally, I would discourage the addition of most secondary or, as they are called, rare elements to fertilizers. We know too little about them and their action on plants and in the soil.

Where the need for a definite element has been shown, for example manganese on the alkaline soils and manganese copper and zinc in the Everglades, it may be safe and advisable to add these elements to the fertilizer. The indiscriminate use of many of these elements should be discouraged unless the farmer is using them in an experimental way for all of them used in excess are decidedly toxic. These remarks do not apply to such elements as calcium, magnesium and sulfur.

The only other change which we will mention is the inclusion of various forms of lime and of raw phosphates as fertilizer materials. In the case of the raw phosphates the available, insoluble and total phosphoric acid is required to be guaranteed, while in the case of lime products the amount of calcium and magnesium and the form in which they are present has to be guaranteed. In the case of limestone a guarantee of the percent passing

## THE CITRUS INDUSTRY

through a 60 and a 20 mesh sieve is required in addition.

While some other changes were made, those discussed are the ones that will affect all users of fertilizers. On the whole the new law is a big improvement over the old one and gives the user of fertilizer a clearer picture of what his fertilizer contains.

### COVER CROP IN CITRUS GROVES

(Continued from page 5.)

tage during the hottest days of the rainy season, because where the soil is kept clean the small roots of the citrus tree develop very near the surface on cloudy or rainy days. When this is followed by a few hot dry days these roots are killed off. On the other hand, where a crop of grass is growing, citrus roots cannot compete successfully with the grass roots in the surface inch or two, therefore they are kept down where they are not injured by high soil temperatures.

Another point in favor of a grove cover-crop, especially the natural cover-crop of a mixture of grasses and weeds, is in the advantages derived from the relationship of growing plants. It is noted in the forest that certain trees thrive better when growing among trees of another kind. For example, it is noted that oaks and pines often seem to do better when growing as a mixture in a forest rather than when growing separately. The same thing has been noted in relation to some of the natural cover crop plants. This leads us to wonder if there may not be an advantage to the citrus trees derived from growing the natural cover-crop around them. It seems that some of the deep rooting plants may go down below the root zone of the citrus tree and bring up plant food elements that are out of reach of the citrus roots, these elements being stored in the growing plant and returned to the top soil when the plant decomposes, making it available to the citrus tree. They may also perform an important function by distributing throughout the soil mass more uniformly the plant food elements through the growth of their roots. At any rate, we seem to produce our best quality of both tree and fruit on the soils producing the most luxuriant growth and greatest variety of native plants in the cover-crop.

So the important thing seems to be the tonnage of vegetable matter that can be produced in a cover-crop rather than finding some particular crop that can be grown by planting it in a well prepared soil. It should ever

be kept in mind that the supply of organic matter in our citrus groves is entirely too low. Too keep up this supply is the dominant problem in citrus fruit production. When we look at fruit production from a purely practical standpoint it seems that the fertility of our soils is determined very largely by the amount of organic matter that decomposes.

There are a good many questions arising as to the proper methods of handling the cover-crop. In the first place, it seems desirable to allow any crop to grow until it has reached the stage of maximum production. At that point it may be desirable to mow the crop and thereby permit a heavier second crop to grow. Especially is this true where the natural cover-crop is allowed to grow early in the season. In the case of a crop of Natal grass it is very desirable to let the seed mature before it is mowed to insure a continuous supply of seed. Also in the case of crotalaria, it is very desirable to mow the striata when the pumpkin bugs make their appearance on it in great numbers. Mowing the crop while the bugs are young will destroy the bugs and thereby protect the fruit. If this mowing is done the latter part of July or in August the crop will sprout out and continue to grow and may make a late crop of seed. In cases where the crotalaria is only a few inches high and there is considerable grass tending to smother it out, it is desirable to mow the grass and give the crotalaria a chance to grow.

It is never advisable to disk in the summer application of fertilizer at a time when the cover-crop is coming and when it may be entirely or seriously set back by the disking operation.

"I can never leave a subject of this kind without calling attention to the opportunities of increasing the supply of organic matter in the grove by mowing weeds and grasses on vacant lots, truck crop patches and elsewhere, and hauling this material into the grove. A great deal of valuable material may be properly utilized in this way and at the same time a few hungry folks may be given food by providing a few extra days work.



# Electric Home And Farm Authority

The Electric Home and Farm Authority has been reincorporated and reorganized to give its operations national scope. It will undertake the financing of retail sales of electrical and plumbing equipment and appliances in cities and in rural areas.

The rural operations of EHFA will tie in closely with the program of the Rural Electrification Administration for financing the construction of power and light lines into territory now without electric service.

In rural areas alone it has been estimated that in the next few years equipment and appliance sales, directly or indirectly attributable to the operations of REA, will total more than \$350,000,000.

EHFA financing is contemplated, however, for only part of these prospective sales. Some sales will be made on a cash basis. Others will be financed through existing private agencies furnishing consumer credit, without intervention of Government loans. Under the plan of operation contemplated, EHFA will seek to avoid or minimize disturbance of these private financing agencies, and of the merchandising agencies as well. Encouragement will be given, however, to the improvement and co-ordination of selling methods.

Plans for the prospective sales and financing in rural areas have been discussed in recent conferences held by Morris L. Cooke, REA Administrator, and other officials of REA and EHFA, with representatives of industry. Private concerns represented in these conferences have included such organizations as the General Electric Company, the Westinghouse Electric and Manufacturing Company, General Motors, the National Association of Master Plumbers, and a number of the larger private electric utilities.

The representatives of Government and industry working in close co-operation have deemed it possible that as many as one million rural homes can be electrified in the next few years. This estimate includes the probable construction by private utilities with their own funds, and by public agencies with non-Federal funds.

On the basis of one million homes, the prospective expenditures for material, equipment and appliances have been estimated as follows:

Wiring and lighting—\$80,000,000.  
Water pumps and water supply equipment—\$50,000,000.

Plumbing and sanitary equipment—\$30,000,000.

Appliance, house and farm — \$209,000,000.

The reincorporation of EHFA is under the laws of the District of Columbia. The Authority, having borrowing power in addition to its small capital, will lend money for purchases of such electrical appliances as ranges, refrigerators, and water heaters, and of electrical farm machinery as well, by the consumers of electricity.

It will make similar loans on plumbing equipment which is to be used in connection with electrical equipment. The plumbing equipment loans will be made particularly for such equipment as kitchen sinks and inside bathrooms which, with the advent of electricity, the electric pump, and the resulting running water system, can be used on many farms which have never known such conveniences heretofore.

EHFA in the past has operated largely in urban territory, limited to the States of Alabama, Georgia, Mississippi and Tennessee — in the TVA region. The authority was created by Executive Order of December 19, 1933, and incorporated in Delaware. With the cooperation of some 50 manufacturers of electric appliances, 24 privately and publicly owned utilities and 300 independent dealers, it has made available to many persons, refrigerators, water heaters, and farm pumps. The Authority neither manufactures nor sells such equipment and appliances. It has financed their purchase by consumers through regular dealer outlets.

David M. Lillenthal, Arthur E. Morgan and Harcourt A. Morgan, directors of TVA, resigned as directors of EHFA some days ago, to devote their entire attention to the increasing activities of TVA. The set-up of the new organization and the terms of its loans will be announced shortly.

The reorganized Electric Home and Farm Authority has elected its officers, it has been announced. The officers are Morris L. Cooke, Administrator of Rural Electrification, president; Max O'Rell Truitt, solicitor of the Reconstruction Finance Corporation, general counsel; William A. Weaver, treasurer, and A. T. Hobson, secretary.

G. D. Munger continues as Commercial Manager.

The operations of EHFA will be di-

rected by a Board of Trustees. The trustees are Mr. Cooke, Gladding B. Coit, George R. Cooksey, Thomas G. Corcoran, Sam Husbands, John K. McKee, Emil Schram, Mr. Truitt, and Morton Macartney.

The headquarters of EHFA is at Chattanooga, Tennessee.

For the present at least a fiscal office will be maintained at the offices of the RFC, 1825 H Street, N. W., Washington, D. C., and an information office at the REA, 2000 Massachusetts Avenue, Washington, D. C.

Mr. Cooke announced that the EHFA does not presently contemplate additions to its staff.

Operations of the Authority, limited heretofore to the States of Alabama, Georgia, Mississippi and Tennessee, will embrace the entire country and will extend into urban as well as rural territory.

Detailed plans of operation under the new set-up remain to be worked out. In the main, however, the method of operation will follow the pattern of the original EHFA.

Electrical farm machinery, electric appliances and plumbing equipment, the purchase of which will be financed by EHFA, will continue to be distributed through existing channels.

EHFA makes no direct loans to purchasers of electric equipment and appliances but does purchase individual contracts through dealers.

These credit facilities will be open equally to all dealers able to meet necessary requirements. Included among dealers are independent retailers and the merchandise departments of privately and publicly owned utilities.

Under the plan of operation employed up to this time and likely to be followed at least in its main outlines hereafter, consumers in the EHFA financing areas have bought their appliances and equipment from dealers on low monthly payments. The payments were collected by the local utility or other central agency and billed to the consumers with their monthly charges for electricity. The utility or other agency then forwarded the payments to EHFA. The dealer received his money immediately after the purchase was completed, upon selling the consumer's paper to EHFA, in accordance with customary commercial financing practice.

(Continued on page 18)



# IMPRESSIONS

.. By ..  
Frank Kay Anderson

State chamber of commerce figures that 31 per cent of Florida's winter visitors come to visit relatives or friends. Thereby creating something of a doubt as to how much money the residents of the state really make out of the tourist crop.

A gorgeous sight, waving fields of Natal grass in all its pink and green. Wonder if our personal fondness for Natal grass is in any way due to the fact that pink and green are the Rebekah colors?

We do enjoy traveling along between vast stretches of Natal grass; and would respectfully point out to the crotalaria and beggarweed advocates that their chosen cover crops haven't nearly the scenic values of our own favorite.

By the way, the original introduction of Natal grass into the United States, according to old U. S. D. A. records, was on the old Harvey B. Hurd place at Altamonte Springs. There it was "found" by the department's plant searchers. It had been brought there by an English traveler who had found it growing in South America whither it had been introduced from its original South African home. Walter B. Ballard of Altamonte Springs many years ago, after he had come into possession of the Hurd place, carried on for a long time a big business in shipping Natal grass seed.

A meeting with a most interesting personage, Captain Eddie Rickenbacker. Most refreshing in that the great war ace makes absolutely no effort to preserve his status as a personage. As the head now of Eastern Air Transport, Captain Rickenbacker is getting ready to give Florida a most tremendous improvement in its air service. Great Douglas air liners carrying 32 passengers, with only one stop between New York and Florida, will be supplemented by smaller, fast Lockheed-Electras which will, as Captain Rickenbacker expresses it, cover the milk routes, serving as feeders.

Comparatively few remember now

that it was Captain Rickenbacker together with certain of his squadron mates who first visioned Florida as a center for future air activities, and, through being ahead of the times, dropped their savings in that ill-fated early air effort following the war, named Florida Airways. Their dream was what today is comprised in Eastern Air Transport and Pan American Airways. Today, as the head of Eastern Air Transport, Captain Rickenbacker finds himself working to fill in the vision of the northern half of the undertaking he first dreamed of in France after the armistice.

Good to find a number of Floridians strongly tied into this great new industry of the air. Tom Caldwell of Lake Wales steadily climbing upward in the executive staff of Eastern Air Transport; John C. Cooper, Jr., of Jacksonville, long counsel for Chase & Co., today considered the great international legal authority on air matters, and serving as general counsel for Pan American Airways; and Carroll Robinson of Orlando, son of J. Curtis Robinson, managing the big San Francisco field to mention just a few.

Most important in a citrus way is the prospect of a considerable improvement and enlargement of air mail facilities from Florida for the coming winter. That will do a good bit to aid in reducing Florida's tremendous telegraph bill annually accumulated in the process of selling the citrus crop.

Not many realize that just an average small Florida citrus shipping concern is vastly more important than some of the big national concerns in the manufacturing field from the viewpoint of the telegraph companies.

Paul and Mrs. Stanton of Frostproof out shopping for a suitable gift for the fiftieth wedding anniversary of Father and Mother Stanton of Haines City, Father Stanton having forehandedly expressed great personal distaste for gold-headed canes. Maybe the elder Stanton doesn't believe a gold-headed cane holds any

material assistance in prospect for his job of purchasing grapefruit for the Polk company.

Florida's supreme court's decision that stealing fruit from a citrus grove is definitely a felony is helpful. It is possible to get rough with one you catch in the act of committing a felony without incurring the legal liability you risk in using force to deter someone from committing merely petty larceny, or another misdemeanor.

Floridians concerned in the Georgia peach deal report that the season was a real success throughout from the standpoint of both growers and shippers. Small sizes reduced the volume but quality and prices were good.

Albert Connelly, who functions in connection with the sales of the Rio Grande Valley Citrus Growers Exchange, drove nine hundred miles home to visit his parents in Sanford. Then on the second day in Florida while driving along a main highway near DeLand turned his car over and demolished it entirely. He escaped with bruises and strains; but drove back westward with a new car and a determination to drive more carefully in the future.

O. G. Strauss, now assistant general manager of the Tree-Gold cooperative, greatly pleased at the outcome of the southeastern watermelon control, which he organized and got going while still in the service of the Triple-A. It was a harmonious operation almost throughout, and prices obtained by holding shipments down to U. S. No. 1s are said to have been most satisfactory to the growers of those states included in the operation.

Hats off to the group of Sanford farmers including Fred Dörner, John Meisch, Ralph Chapman, Joshua and Randall Chase, Perry Whitehurst and others who comprise the mainsprings of the Seminole County Agricultural Assn. for the leadership they provided in the scrap against authorization of the cross-state canal unless okayed

by the U. S. Geological Survey. While others hesitated or voiced ineffectual local protests they went to bat. Using their association's funds and money out of their own pockets they employed A. P. Michaels, most competent engineer, who went to Washington reinforced with abundant geological and other data and seemingly made a real impression there.

Marvin H. Walker of Tampa, who a little later took the field and made a series of most effective speeches on the subject at various points in the state, gave credit to the Sanford group for much of the material and data he presented. The water supply of the Sanford celery delta is a vital thing to those Sanford farmers; and they do not wish to see their flowing wells possibly jeopardized by enthusiastic and hasty action on the part of the canal advocates.

Interesting to learn that the unusual and exotic illustrations in color used recently to advertise Dole's Hawaiian pineapple juice, that so quickly has stepped into popular favor, are the work of Lloyd Sexton an artist living upon the island of Hilo in the Hawaiian group. He had never done an advertising illustration previously; but evidently he knows his Hawaii and knows his pineapples too.

That is remindful of what once was told us by an official of the California Fruit Growers Exchange, that they couldn't get an illustration of an orange that looked like an orange until one day a local portrait painter who lived on an orange grove got tired of seeing in print the likenesses of croquet balls then being featured, and tried his hand at painting California oranges as they looked to him.

Some Florida artists might well make intensive studies of Florida oranges and grapefruit and try recording their impressions. To date the picturing of Florida oranges and grapefruit has not been sufficiently successful to brag about it. Generally the most accurate representations have been by photography; but it is accepted in advertising art circles that the most attractive color plates result from reproductions of artists' creations rather than from actual photographs.

Anton Breese, the Master of the Bells at the Bok Tower, naturally gets into print frequently in Florida, and generally is referred to as a Belgian citizen. Since Mr. Breese through his marriage into the well known Yar-

nell family now is at least a "citrus in-law," it is interesting to discover that he became an American citizen in Tampa in May, 1931.

For real appreciation of a humorous story Victor Gentile of Orlando is in a class by himself. Given a good raconteur to listen to, and he begins to chuckle and grin in anticipation well ahead of the explosion point; and when that is reached really lets loose in a way to gratify the story teller's heart.

And the Governor's quest for "eleven honest men" led him clear to France. Everybody hopes he finds 'em, no matter how far he has to go. His job is just eleven times harder than the one that wore old Diogenes down until he was "all whupped out."

J. S. Crutchfield, Pittsburgh, head of American Fruit Growers Inc., spending a lot of time in Florida recently; and very much in evidence all over the citrus portions of the peninsula.

C. A. (Charley) Stewart of Frostproof now out on his own, and organizing his own citrus sales agency down The Ridge after a recent tour of eastern markets.

Down at Frostproof Major Edward T. Keenan has been developing the service of his Soil Laboratory on a national scale, now drawing his clientele from all over the country and making soil analyses for them from everything from the rocky soils of New England through the black loam of the prairies to the adobe soils of the West. Thereby carrying the name of Frostproof, Florida into far places.

Not to mention that advertising which Frostproof receives from the legends on the hundreds of thousands of cans of grapefruit and grapefruit juice of Florida Fruit Canners, Inc., on grocers shelves all over the country, in addition to that which comes from the fresh fruit packing houses that constitute Frostproof's big business.

Yet it is less than twenty years ago when the trip to Frostproof from Bartow, where we then lived, was a jouncing jaunt across country over sand trails for about 35 miles. We used to ride over with Charley Walker when he went to contact the Frostproof packing house of that day; and there was darned little then at Frostproof when you arrived except a

mighty good dinner at the little hotel. We recall distinctly when Frostproof shed its swaddling clothes with an election which settled that cows and pigs must be kept off the streets; and were discussing it right recently with out present neighbor Mrs. Arie M. Barber, whose late husband was one of Frostproof's early mayors.

Lake Wales, a little before the time we mention and before the advent there of the late Joe B. Briggs, consisted of one house on the lake surrounded by miles of the finest virgin pine on the peninsula. Joe B. Briggs took hold of Lake Wales in the form of blue prints, with the backing of E. C. Stuart and G. V. Tillman, and pushed it up into a thriving bustling town in record time; and then Frederick Ruth who, with the same backing, turned his vision of a Florida paradise into Mountain Lake Park and furnished the background for Edward Bok's dream that materialized into the Bok Tower, so that all the world now has heard of Lake Wales.

All the development down The Ridge to a citrus accompaniment, systematic plantings, that W. J. Howey started, up near Lake Hamilton

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**Frank Kay Anderson**  
Agricultural Advertising  
On the Old Homestead, near  
Altamonte Springs, Fla.

Serving some of the South's foremost businesses.



spreading like magic down to Lake Placid. Now perhaps the most wonderful acreage of oranges and grapefruit anywhere, with splendid modern packing houses furnishing employment to hundreds and sending out a vast volume of golden fruit to the markets of the North.

When Joe Briggs was most active in promoting Lake Wales we were still engaged in the advertising business in Chicago. On trips back to Florida we frequently coincided with him, both going and coming, aboard the Dixie Flyer; and those were joyful occasions. Of all the empire builders ever we have encountered Joe B. Briggs was the brightest and best company. Every train and Pullman conductor and porter between Bloomington, Illinois, his northern headquarters, and Lake Wales hailed his advent with delight.

At about the same time we used to drop into an office up in the American Trust building in Chicago and frequently visit with a long and lanky individual, who probably would have called us an imaginative liar if then we had suggested that some day he might be a candidate for governor of Florida. Not nearly so lanky now, but pretty well upholstered, the same W. J. Howey now of Howey-in-the-Hills has twice been candidate for governor of Florida.

Supreme court of the State of Washington recently decided the fruit commission there after which Florida's new citrus commission pretty much is patterned, didn't have the power to do many of the things it was set up to do, particularly that it was unconstitutional for it to collect one cent on each box of apples for the cost of its maintenance. Suit brought by the commission against one shipper to collect the one cent per box tax, which that shipper had refused to pay, was in the lower courts decided in the commission's favor. Appeal to the state supreme court brought reversal of that decision.

That marks the end of the second attempt by Washington apple factors and state authorities there to regulate apple affairs by a commission. The law creating the first commission in 1933 was knocked out by the courts. A new law then was passed which some thought might be workable. This is the enactment recently ruled also to be unconstitutional.

The Messrs. Baskin out enjoying themselves again at our old swim-

ming hole; and lo, J. L. (Jimmy) Baskin somehow lost that famous pipe. We look for sales of potash to drop off somewhat in the near future. That pipe in itself was a pretty strong argument.

It is but natural for readers to conclude that persons we mention frequently are important. Therefore we pause to explain that the said J. L. Baskin of the NV Potash Export My. seems frequently to be about under foot, is reinforced by that formidable incinerator in his face, and further so loudly advertises himself as an original Democrat, as to obtrude, perhaps unduly, upon our consciousness.

This is the season for the annual outbreak of nut letters from Floridians in the North. One published in an East Coast paper written from up in New York state in the middle of July. The writer virtuously indignant because no Florida oranges to

be had, but plenty of California oranges about; inclined to blame the circumstance upon the alleged superiority of the California marketing scheme. Every summer the same thing. One would think it might occur to some Florida newspaper folks to write back to some of those complainers and ask 'em how in tunket they expect to buy Florida oranges off at a distance at a time when there aren't any to be had here at home, instead of giving space to such letters.

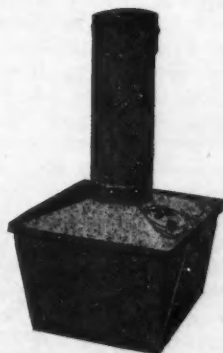
For the benefit of some of those who so freely lend their voices and pens to straightening out the affairs of the world, we'd like to complain that we have found it impossible at any season in New York, Boston, Philadelphia, Cleveland, Pittsburgh, Detroit, Chicago, Milwaukee, Minneapolis, St. Louis, Kansas City, Denver and several other places to obtain grits for breakfast. Maybe they'll do something about that.

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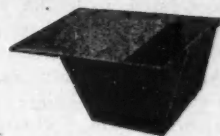
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9 Gallon  
Junior Heater



9 Gallon  
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Florida Distributors — TAMPA

**NATIONAL-RIVERSIDE HEATERS**  
"Kill Frost at Little Cost"

*Citrus Fruits, Texas*

# Observations Of The Citrus Industry In Texas

By JOHN HENRY LOGAN, Manatee County Agent

These observations were made on a recent trip through the entire Citrus producing area of Texas, in company with Mr. F. E. Boyd, Chilean Nitrate Educational Bureau, Orlando, Florida. We began at the extreme northwest point where only backyard plantings of hardy citrus varieties were grown at San Antonio, thence south to Laredo where only a few commercial groves of hardy citrus are located, thence east and south to Hidalgo and Cameron Counties in the extreme lower Rio Grande Valley where the bulk of citrus is planted, returning via Raymondville in Willacy County, and thence north through Falfurrias, Brooks county where the last commercial groves are located, traveling north and east.

Representative men were contacted in almost every line of business, associated with the agriculture of that section including: Chamber of Commerce Secretaries, County Agents, Fertilizer and Insecticide Dealers, Real Estate Men, Railroad men, Packing House Executives, Nurserymen, Experiment Station Workers and Growers.

As is always the case in the development of a new crop in a section, many mistakes are made and Citrus in Texas is no exception. Some of these pertained to the irrigation and drainage of the land, location of groves on improper soils, use of wrong root stocks, and excessive investments in developed groves.

There are records of Citrus plantings in Texas as early as 1906, but their first car moved in 1920 and most of the commercial development has taken place since that time, there having been more than 120,000 acres planted to date. Their largest crop was on trees during season of 1933-34 when it was estimated that they had 20,000 cars. They only moved 4100 cars on account of hurricane of September 1933. They moved 7300 cars during season of 1934-35 and estimate that they have 5000 cars for 1935-36 crop.

Various reasons are given for their small volume of fruit in comparison to acreage, such as: frequent freezes, hurricanes, unadapted root stocks, and alkali in soil and irrigation water. They have not been able to counteract any of these hazards suc-

cessfully. When their trees reach the age of about ten years they begin to decline on account of the roots reaching into alkali. This shows up first as a yellowing and frencing of the leaves, later dead wood develops and in many cases trees die. They have not found a treatment for this condition and according to authorities there, this condition is universal over the Valley.

Judging from the type of soil, growth on some trees, and information secured from reliable sources, citrus trees in the Valley grow very fast for the first few years and recover quickly from severe storms or freezes. There are a few growers there, who think that they will be able to grow citrus economically, and replace trees every ten to twelve years.

Very little fertilizer is used until the trees begin to bear, but most progressive growers are now beginning to fertilize bearing groves. The analysis used varies widely, but generally they use high analysis mixtures of nitrogen and phosphoric acid, 16-20-0 and 16-48-0 seemed to be the most popular mixtures. Practically no potash is used in their fertilizers.

The average sample of Valley soil shows about ten times the amount of available Potash as Phosphoric Acid or Nitrogen. The Ph value of their Citrus soils is around S. O.

Meteorological information available, shows that their frosts and freezes have been too frequent for the safe production of citrus fruits. This is further brought out by the fact that you do not see the wild or cultivated tropical and sub-tropical fruits that are produced in other citrus areas, growing there. This past winter they had minimum temperatures of from 20 to 24. Since, according to Texas people their trees were still showing the effects of 1933 hurricane and had also passed through the freezes of January and February this year, this report may sound gloomy for Texas citrus, but it is intended to picture the situation as observed rather than what it might or has been.

Texas Citrus Packing House men estimate that they will have about 5000 cars of Citrus this coming season, and that with no disasters they

will be back to their 1933-34 crop estimate of 20,000 cars by 1938-39. From my very limited experience and observation there, I would be inclined to think both of these estimates far too optimistic.

Growers are starting a program of diversified farming. In Cameron, and Hidalgo, the two citrus counties, they are growing corn in a great many abandoned and poor groves. They have just completed two large elevators and estimates are that they have about 40,000 acres planted to corn this year, under contract. There is also a large acreage in cotton, grain sorghums and general truck crops.

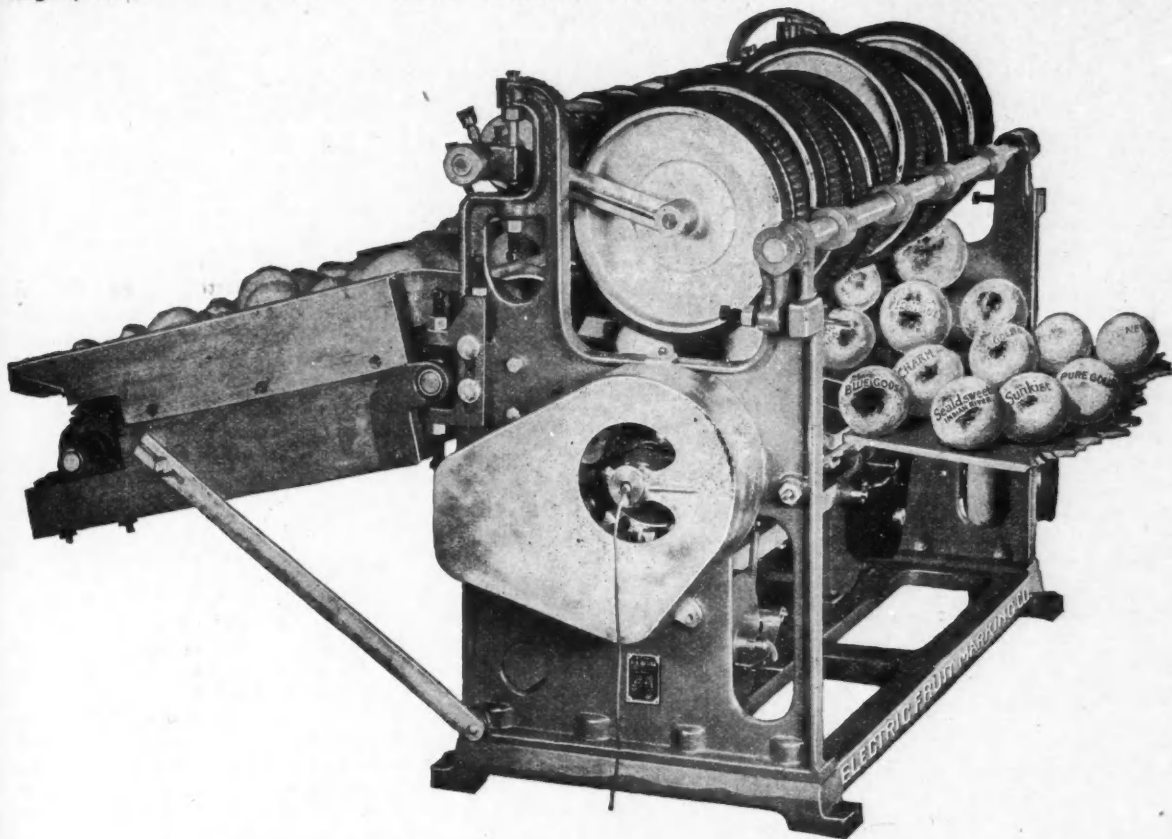
The people generally in the Lower Rio Grande Valley of Texas, are more interested in oil, than any other one thing at present. A good many wells have been brought in recently in the western edge of citrus belt, around Mission, Texas, and refineries have been constructed at McAllen and Harlingen. Real Estate operators are pushing oil leases and not grove properties. They are spending millions of dollars, developing their water facilities for shipping.

Their citrus is divided about as follows according to varieties: Marsh Seedless Grapefruit 73%, Pink grapefruit, including Foster, Thompson and one or two other pink varieties 7%; Duncan grapefruit 5%; Oranges, Tangerines, Satsumas 15%.

Water for irrigation purposes is brought in from the Rio Grande river through large canals and is fed out through laterals all over the area. It is operated by irrigation or water improvement districts. The charge is usually about \$3.50 flat per acre and then \$1.25 to \$1.75 every time they irrigate. Their rainfall averages about 25 to 30 inches per year and no citrus is attempted to be grown without irrigation. Drainage is a real problem with them, in times of heavy rainfall. Levees and Flood Control areas are used to keep the Rio Grande river from overflowing on them, since some of their citrus lands are eight feet below the bottom of river.

Texas Citrus Growers are a very cosmopolitan group. They are largely from the mid-west and have bought  
(Continued on page 20.)





## All Bulk Fruit Must Be Stamped

Your marking machine requirements should be determined as soon as possible. Any delay may cause you serious inconvenience.

With the growing trend amongst packers to wax fruit, it has become doubly important that the fruit be permanently marked by the Electric Marking Machine process. Moisture, climatic conditions, refrigeration and sweating weather before or after, do not affect the electric mark. This indestructible mark is accomplished by a heated die, thermostatically controlled, carrying on its surface suitable coloring matter which, coming in momentary contact with the fruit, melts the natural wax of the fruit skin, leaving a permanent and legible imprint of the desired trademark.

**The Electric Fruit Marking Machine offers a dependable trouble-free, automatic service. It is installed without difficulty in any packing house, usually adjoining the grading table or the fruit sizing table. A complete machine consists of the marking machine, one electric motor, one heat control, one set of dies and two paper ribbons.**

**It is now built in sizes to accommodate practically any requirement of the citrus packing plant and will mark oranges or grapefruit with ease.**

COMMUNICATE WITH

# Food Machinery Corporation

Florida Division  
DUNEDIN, FLORIDA

## Reducing Decay In Early Shipments Of Florida Oranges And Grapefruit

By J. R. WINSTON, Senior Horticulturist, Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, United States Department of Agriculture

Citrus fruits produced in the humid areas of the United States do not possess keeping quality equal to that of similar fruits produced in arid climates. To a large extent this is due to decay-producing fungi which thrive under moist conditions, particularly the stem-end rot fungi, one of which also causes the brown-rind discoloration known as melanose.

These decay organisms develop rapidly in summer temperatures but their rate of progress is greatly reduced at temperatures of 50°F. or lower. High temperatures account for the greater abundance of stem-end rot in producing areas and on the markets as well during fall and spring when the weather is warm throughout the country. Fortunately the greater part of the Florida crop is shipped during the colder months when the fruit receives free refrigeration by the low outside temperatures, not only after arrival at the northern markets but during the greater part of the transportation period. This is of inestimable value as an aid in the retention of that fresh-from-the-tree flavor as well as in preserving Florida fruit from rapid spoilage, especially by stem-end rot.

The stem-end rot fungi are quite limited with respect to the place where they enter the fruit. In practically every case entrance is made through the stem or stem parts and because of this characteristic the disease is somewhat less difficult to cope with than it might otherwise be. The causal organisms develop in the groves, establish themselves in the stem parts sometime during the growing season, and remain there until after the fruit is harvested if it is not overripe. The advance from the stem into the fruit proper usually requires several days, a period longer than is normally required in the packing operation, hence at the time the fruit is packed the decay organisms are still confined to the stem.

There is still another feature—one that concerns the fruit itself—that can be taken advantage of in attempts at checking decay. It so happens that early in the fall when stem-end rot is likely to be severe the fruit is subjected to ethylene gas

for the purpose of dissipating the green colored pigments in the rind; during the first month or two of the season this gassing treatment causes the stems to loosen and many of them fall out while the fruit is being washed and polished. Luckily this loss of stems occurs before the fungi have had time to advance from the stems into the fruit. The remaining stems can be brushed or rubbed off by hand without difficulty.

So, with an understanding of (1) the climatic and seasonal conditions that influence the development of these decay producing fungi; (2) their preferred avenue of entrance into the fruit and the time required to penetrate the fruit proper, and (3) the disbuttoning effect of ethylene and the role played by the timely use of antiseptics, there is a good basis for developing effective and economical control measures.

With most of these facts to go on the shippers of Jamaica citrus fruits have for years disbuttoned by hand such of their grapefruit as had previously been given the ethylene treatment. Although the removal of stem buttons has given satisfactory control of stem-end rot such a program has its commercial limitations. It hardly fits in with mass production when packing houses are running at full capacity, and there are times, especially later in the season when the degreening treatment is neither needed, nor effective in loosening the stems to such an extent that they may be removed without difficulty. At such times antiseptics and refrigeration are the chief weapons of defense against this decay.

Fortunately, fruit shipments from Florida are not as heavy in the fall when protection from stem-end rot is most needed, as they are during the season when disbuttoning with gas is most effective. However, this is also the period of high prices, and in order to prevent heavy financial discounts due to decay, precautionary measures that are effective not only while the fruit is in transit but during the marketing and consuming period are especially important.

It is generally recognized that an application of borax given as soon

as the fruit reaches the packing house and before the gassing treatment, reduces stem-end rot greatly; the treatment is probably most effective early in the season when stem-buttons loosen readily.

It has been demonstrated that two or three extra men working at the foot of the grading belt have no difficulty in brushing off all adhering stems by merely exerting a slight pressure on the stem of fruit that had not lost its button during the washing or polishing operation. When this demonstration was first made stem-end rot was causing heavy losses but these were stopped when the buttons were removed. Convincing evidence of the relation of adhering stems to stem-end rot was obtained from third grade fruit set aside in the packing house awaiting peddler trucks or to be hauled to the cull



- Here is the most economical and easily handled cutter on the market.
- It goes anywhere, cuts anything, and enables one man to do the work of four or more with hand scythes.
- It has a 36-inch sickle driven by a powerful one-cylinder gasoline motor and is mounted on a free running 30-inch wheel, allowing it to be backed up, pivoted sharply, or tilted up or down slopes similar to a wheelbarrow.
- It is now produced by a recognized leader among mower manufacturers and during over four years of service, thousands of users have enthusiastically testified to its dependability.

Write for prices and Bulletin No. 7

**DETROIT HARVESTER CO.**  
 5450 W. JEFFERSON AVE. DETROIT, MICH.



pile. This fruit had remained there for three to twelve days, when records were made of the percentage of decay in fruit with stems still adhering as compared with that in fruit without stems. In every instance there was more decay in the fruit with stems adhering, ranging from 3 to 10 or more times as much, varying more from crop to crop than with advanced holding periods.

The disbuttoning of fruit by hand which is easily accomplished during the early part of the shipping season, combined with the use of a borax bath before the fruit is subjected to gas and again during the washing process are steps that can be taken at but little cost, and the reduction in decay will be well worth the effort especially if the shipper is interested in the losses from decay that the retail merchant must make allowance for when he buys the or-

dinary run of Florida fruit. In the long run it is the grower who pays for these losses, not the merchant.

#### Summary

The heavy losses from decay that occur annually during the early part of the shipping season are due almost solely to stem-end rot.

These losses are preventable at but little cost by treating the fruit with borax before gassing and following this by removal of the stem-buttons during the packing operation. Stems not removed during scrubbing or polishing may be removed by two or three extra men working at the foot of the grading belt.

Disbuttoning after gassing is practicable only during the early part of the season when there is great liability to decay; the borax treatment is feasible throughout the year even with fruit that is to be or has been disbuttoned.

*Citrus Fruits, By-Products*

## Cattle Now Fatten On Citrus Refuse

USE IS FOUND FOR THE WASTE FROM CITRUS  
CANNING PLANTS

DR. WILMON NEWELL, Dean Florida College Of Agriculture

At one time cotton seed were dumped into the Mississippi and other rivers to get them out of the way. Today they often represent the profit on the cotton crop. Other instances of the utilization of waste products are numerous, and in some cases profitable industries have been built entirely on goods formerly not utilized and sometimes even disposed of at considerable expense.

Industrialists and farmers now realize that in proportion as practically all parts of a farm product can be commercially utilized, the output is likely to prove profitable. Florida citrus fruits in this respect are not essentially different from other crops.

Recognition of this fact has long existed among growers and shippers. Canneries and by-product factories have been developed that more of the oranges and grapefruit might go into consumption. While these plants have absorbed much of the lower grade and surplus output, they take by no means all of it. Further, their operations in themselves create a vast volume of waste.

Surveys have disclosed that between 65 and 75 percent of the grapefruit processed by canners remained as refuse and was discarded. Waste at the canning establishments of Florida, in the five year period which began with the 1929-30 season and

ended with 1933-34, averaged 64,642 tons annually.

Avenues for the profitable utilization of grapefruit cannery waste have been sought by the Florida Agricultural Experiment Station with a considerable degree of success. Investigations concerning the feasibility of converting the refuse into feed for livestock have revealed promising possibilities along that line. Feeding tests with the material gave excellent results.

Jersey cows in the Experiment Station herds learned to eat the product of their own volition, in from one to six days, when it was offered to them after they had finished with the rations fed daily. Steers accepted the feedstuff freely from the beginning of the time when it was supplied.

Digestibility of the feed was demonstrated in other experiments. Since few products can be used as the sole diet in animals, in these studies the cannery refuse was combined with cut No. 1 alfalfa hay and cottonseed meal, and fed dry.

Cattle consuming the mixture in large proportions soon took on a sleek, oily appearance, indicating thriftiness. A moderately laxative effect of the new feed also was observed in checking up on the animals.

Grapefruit cannery waste used in

the feeding tests included the peel, the rag and a few seeds. Moisture content had been reduced to eight or ten percent from more than eighty.

Processes have been patented which dry the refuse by means of pressing and exposure to heat. After bagging, it stands for a short time in air-dry warehouses.

In the dried form, as fed at the Station, the cannery leavings constitute a concentrate, high in digestible carbohydrates and low in protein. Use is suggested as a substitute for part of the corn feed meal furnished to animals. The place of dry beet pulp also might be taken.

Research on the subject covering other aspects still is under way at the State Agricultural Experiment Station, in Gainesville.

When all parts of this state's citrus fruits are utilized, growers will find their groves more profitable than at present. In an effort to that end the Experiment Station is supplementing its service bearing on fruit production.

BRUMLEY RETURNS AFTER  
DOING ADVANCED STUDY

*Brumley Frank W.*

Frank W. Brumley, economist in farm management with the State Agricultural Extension Service, returned to the state August 1 after an absence of 10 months during which time he pursued advanced study in agricultural economics at Cornell University. Mr. Brumley has passed all requirements for the doctor of philosophy degree, which will be awarded him in September.

The farm population of this country, like the soldiery of the old world, has consistently been dealt short rations and long eulogies.—Rexford G. Tugwell.

Spuds Johnson says that handwork and footwork amount to a great deal more if directed by good headwork.

### FOR SALE

Lists of Florida Citrus Growers compiled from recent survey of groves, arranged by counties. Name, address, acreage and legal description.

Also list wealthy residents of Florida.

**W. L. Lamar**  
P. O. Box 163  
ATLANTA, GA.

## ESSENTIAL PLANT FOODS

(Continued from Page 6)

Potassium is absolutely essential for plants and cannot be entirely replaced by any other element, though sodium may be substituted for potassium to a limited extent. The plant can absorb from the soil and utilize in its metabolism any soluble inorganic compound of potassium. Apparently the form in which it is presented to the plant, if soluble, makes very little difference. Potassium is distributed throughout the plant and in many instances in the soluble form for the extracts before and after ashing contained the same amount of potassium. So, in some instances, potassium seems to be present in the plant cells in the form of inorganic compounds as well as salts of organic acids.

The role of potassium in the plant is not exactly known. It has been pointed out that carbohydrates are formed normally only when the potassium supply is sufficient, so in the synthesis of sugar, potassium is essential. Potatoes and other crops that form a large amount of carbohydrates are reduced in these materials by a deficiency of potassium. This reduction occurs in many instances before any diminution in the vegetable growth of leaves and stems can be observed.

Many authors agree that potassium plays the role of a catalyst. A catalyst is a substance that changes the velocity of a chemical reaction but does not appear in the final products of the reaction.

As plants differ in their response to potassium they have been grouped in reference to their requirement for this element as follows: low potassium crops:—oats, rye, wheat, millet and carrots; medium potassium crops:—barley, rutabagas, potatoes and cabbage; high potassium crops:—tomatoes, corn and onions. The calcium and potassium content of plants seem to be interrelated, for it has been found where there is an increase of calcium in a plant there is a decrease of potassium, and where there is an increase of potassium there is a diminution of calcium.

Much excellent work has been done relative to potassium. We need more exact and detailed knowledge relative to the role of potassium in plant life. Especially is this true concerning plants grown under Florida soil and climatic conditions. We need to more fully understand the relations of nitrogen, drought and cold of plants. We need more information relative to the influence of these

## THE CITRUS INDUSTRY

elements upon size, flavor and keeping qualities of fruits, vegetables and tubers grown under conditions applicable only to Florida.

## ELECTRIC HOME AND FARM AUTHORITY

(Continued from page 10)

The interest charges and a small additional charge for bookkeeping and collection costs have been substantially lower than any previously available to buyers of electric household equipment. These low charges and relatively long terms, in conjunction with the low retail prices required for EHFA approval of an appliance, have materially reduced the cost of electric appliances in the areas served.

EHFA makes its financing plan available only in areas where rates are deemed low enough to justify the full use of electricity by families of moderate income.

More than fifty manufacturers of electric refrigerators, electric ranges, electric water heaters and electric water pumps, heretofore have joined in the Authority's program for marketing low cost standard quality appliances at prices and finance costs which made their use economic for families of average means.

In the four States approximately 300 retail dealers have participated in the sale of appliances approved and financed by EHFA.

## FRIENDLY FUNGUS WILL AID CITRUS GROWERS IN CONTROLLING WHITEFLIES

Citrus growers whose groves are troubled with infestations of common whiteflies should take advantage of the opportunity to spread red aschersonia in their groves and control these pests efficiently and cheaply, says Dr. E. W. Berger, entomologist with the State Plant Board. This should be done before the period of summer rains is over, he adds.

A grower in DeSoto County recently sent in his tenth annual order for 10 cultures, Dr. Berger states.

A culture is sufficient for spreading over about an acre of trees. It is supplied by the State Plant Board at \$1, and directions are furnished for applying the fungus.

One of the surest ways to get extra feed from pastures is to apply a top-dressing of fertilizer.

Soaking in alcohol will remove iodine stains.

August, 1935

A CORRECTION *to article*

*Limited Discussion of Oil Sprays*  
The Citrus Industry deeply regrets one of those unexplainable errors which crept into that most important article "A Limited Discussion of Oil Sprays" in the last issue of this publication.

The fifth paragraph in column two on page nine, under the sub-head "Types of Emulsion" should read:

"A quantitative feature of importance is the oil content of the emulsion. In Florida this ranges from 60 to 83 gallons of oil in 100 gallons of emulsion. A 60 per cent-oil emulsion is diluted 1 to 60 to make a 1 per cent oil spray. An 83 per cent-oil emulsion is diluted 1 to 83 to make a 1 per cent oil spray. Certainly the maximum amount of oil that can be released in spraying is the amount of oil built into the emulsion. EVERYTHING ELSE BEING EQUAL an emulsion is valuable in proportion to its oil content."

In the second column on page twenty-four, the paragraph concerning aphids, should read as follows:

"Aphids—apply one-half per cent or more oil plus nicotine sulphate 40 per cent at 1 to 1200 (one quart to 300 gallons). Sooty-mold fungus can be removed with 1 per cent oil. Bordeaux-oil—One-half per cent oil added to bordeaux increases its spread to some extent and assists in resisting rainfall. There are spreaders, however, that add more to the efficiency of bordeaux than does oil. Such a small amount of oil, especially when used with a bulky material like bordeaux, has but little insecticidal value. On light infestations, a 1.25 per cent oil with bordeaux generally controls the insects but on medium to heavy infestations it is better to follow the bordeaux with 1 2-3 per cent oil in June or July."

By comparing the above paragraphs with the erroneous ones appearing in the July issue, the true sense of the article may be had.

Every hen that molts during August, indicating that she has quit laying, should be culled and sent to the grocery store or chopping block.

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# Citrus Markets 'Round The World

By FRED E. KUNKEL

Argentina imported 10,842 boxes of oranges in one month recently.

The demand for American oranges in Belgium has been good, a total of 3500 boxes being sold recently.

Czechoslovakia imports oranges mostly from Spain and Italy, direct imports from the United States being insignificant, amounting only to 32.2 metric tons as compared with 20,685.1 shipped into the country in a year's time, of which Spain supplied 56%, Italy 35%, Palestine 4%, etc.

There is a brisk demand for oranges in Poland, due to the recent decrease in duty. The popularity of oranges has been increasing in recent years, but high prices tend to restrict sales. With the lowering of the duty there has been a noticeable increase in consumption.

Grapefruit are not well known in Poland and although the public is commencing to appreciate their qualities, the price is still too high for the average purchaser.

The principal supplier is Palestine (in metric tons) 1151.6, Italy ranking second with 1050, and Spain third with 975.2, while the U. S. comes in at the bottom with 195.2.

Shipment of citrus fruit to Poland, particularly oranges, must be accompanied by certificates of origin in order to benefit by the duty reductions accorded U. S. merchandise, under our commercial treaty with Poland. These certificates must be signed by a notary public and subsequently sent to the nearest Polish consulate for visa. The cost is 1% of the invoice value of the products named in the certificates.

In addition, shipments of fresh fruits to Poland must be accompanied by a certificate issued by the Department of Agriculture made out in triplicate and legalized at the nearest Polish consulate. The fee is \$1.10 for each set of certificates.

The object is to certify the contents of the shipment as well as that all packing materials have been thoroughly examined and are free from plant diseases and pests.

These requirements are in addition to the necessity for ordinary commercial invoices. Polish regulations also require that citrus fruits be imported into Poland direct without unloading in ports of a third country.

## The Grapefruit Market In England

The state of the market for grapefruit is more or less of a mystery to importers. Difficulty is found in understanding why the very low level of prices prevailing in recent months has not been effective in bringing about an increase in consumption. An explanation suggested in one quarter is the increasing popularity of orange juice. It is said that a large number of households which had acquired the habit of having grapefruit for breakfast, have been substituting orange juice instead.

Of course, another reason is that there is a considerable duty disadvantage on grapefruit as compared with oranges, being 5s. per hundred weight as against 3s. 6d. on oranges.

The higher duty on grapefruit was fixed at a time when grapefruit prices were substantially above orange prices, so that on an ad valorem basis grapefruit was at no disadvantage. Now, however, that the price of a case of grapefruit is less than the price of a case of oranges, the higher duty on grapefruit becomes a distinct disadvantage.

Another disadvantage is that retailers in most cases seem to be charging a higher margin of profit than they do on oranges, perhaps due to the fact that they consider grapefruit as a semi-luxury, whereas oranges have now become a staple article of commerce.

## The Netherlands Market For Citrus

Although consumption of grapefruit in the Netherlands is gradually increasing, the market for this type of fruit is restricted to a few thousand boxes per month, Palestine is the principal supplier, but shipments are also being received from California.

Retail prices for grapefruit, as compared with other fruits, are high and the taste of the public has not yet developed to the point where the price plays any important part.

In order to maintain the favorable reputation enjoyed by American fresh fruits on the Netherlands market, great care should be taken by American exporters when making shipments of matured grapefruit to this country. Grapefruit which is past its prime can "melt" very rapidly. The decay is accompanied with much juice, which rapidly spoils the other fruit, and also stains the boxes.

An interesting experiment was made recently, a trial shipment from Texas in common stowage. Naturally any means of bringing the cost to the consumer lower will be a considerable aid to stimulating the Netherlands grapefruit market. For this purpose a trial shipment was recently made in order to determine the feasibility of shipping grapefruit from Texas to Europe in common stowage.

The shipment consisted of Marsh seedless grapefruit and was forwarded coast wise from Texas to New York, and from New York to Antwerp, all the way in common stowage. Upon arrival at Rotterdam the fruit was firm, bright and without a trace of wither. The buttons were invariably tight and all in all the ship-

(Continued on page 22)

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# Vedalia And Other Friendly Ladybeetles

By DR. E. W. BERGER  
Entomologist, State Plant Board

It is no new story to the older growers of citrus in Florida that scale-insects, aphids, mealybugs and some other insect pests are frequently very effectively destroyed by other insects. These really effective insect enemies of insects belong to four groups: namely beetles, minute wasps, a few flies and a caterpillar or two. I am saying nothing of the many other predacious insects that prey upon many other insects such as the larger wasps upon spiders and caterpillars, assassin bugs and the wheel-bug that stick their pointed beaks into caterpillars, aphids and what not (even careless humans). As a matter of fact, there are probably only a few groups of insects that do not contain members that destroy other insects in smaller or larger numbers. However, today we confine ourselves to discussing a few of the outstanding predacious members of the large order of Beetles.

Foremost among these is the Vedalia, or Australian Ladybeetle. The story has frequently been told how Cottony-Cushion Scale was brought from Australia into California on some acacia trees back in 1868 or '69. How twenty years later California citrus growers were fearful that they would not be able to stay in business on account of the Fluted Scale, as the Cottony-Cushion Scale is also sometimes called. It must be remembered that effective spraying with insecticides had not as yet been developed at that time. But, even today, growers do not care to make the effort necessary to successfully control Cottony-Cushion Scale by spraying. Why do so, when it is so easy to let George (the Vedalia) do it.

It had been observed that this scale caused but little if any injury to plants in Australia, so that entomologists conceived the possibility of finding a natural enemy there that controled it. Hence, in 1888, the year of the Melbourne Exposition, a Mr. Koebele, an entomologist, was designated as a U. S. representative to the exposition by the State Department at Washington, D. C., but under instructions to investigate the Cottony-Cushion Scale situation there with the object of finding a natural enemy of this pest that had become such a bugaboo in California. He found the Vedalia, also called the Australian Ladybeetle, and a minute

parasite of the fly family, called the *Cryptochaetum*. Both were successfully introduced into California and it is further reported that in eighteen months the Cottony-Cushion Scale menace was under control. The Vedalia was later (in the 90's of the last century) introduced into Pinellas County, Fla.

The Vedalia, or Australian Ladybeetle is hardly one-eighth inch long, red with black spots, pretty and some vamp. Researchers credit her with progeny of 150 or more. We send them out in colonies of ten, and assuming that one-half of them are females we calculate that the first brood by the end of about thirty days may consist of something like 750 young beetles. We will permit you to do your own "figgering" as to the number involved in the second brood, by the end of about another 30 days. You must remember, however, that they need plenty of Cottony-Cushion Scale on which to feed in order to reach these proportions. They are very fastidious, however, and feed practically only on Cottony-Cushion Scale. And while they remind me of chickens and some humans that just cannot eat this or that and circle about like cats before hot soup, that is their business, and we just have to toady to them and give them Cottony-Cushion scale to eat whenever we can find it for them. But that they can and frequently do eat it up slick and clean is evidenced by the fact that complete eradication of the scale not infrequently follows the introduction of Vedalia.

When the Entomology Department of the Plant Board first undertook the propagation and distribution of the Vedalia nearly 20 years ago it was soon able to perfect a satisfactory procedure so that unlimited numbers of Vedalia could be raised granting the necessary supplies of Cottony-Cushion Scale with which to feed them and to permit their propagation. This explains why we always urge those requesting Vedalia to send some scale as we need it to feed the young Vedalia that we have coming on.

The Entomology Department of the Plant Board has sent out thousands of colonies of these useful ladybeetles to those requesting them. A colony consists of ten and this is sufficient for getting them started in an

infested property. A nominal charge of \$1 per colony is made as no other money is available for rendering this service.

Between the supplies it is possible to raise in the laboratory, when sufficient Cottony-Cushion Scale is available, and some received from Plant Board employees stationed in the field, we manage eventually to meet all requests received although we sometimes run short so that a correspondent may have to wait several weeks before receiving a colony.

It has been estimated that the money value of the Vedalia to the citrus growers alone amounts to the saving of a spray bill of something like 4 1/2 million dollars annually, which it would cost to control Cottony-Cushion Scale by spraying alone.

Another useful ladybeetle, also first imported into California from Australia, is the Mealy-bug Destroyer. It is also known as *Cryptolaemus*, or "Crypt" for short, the first part of its scientific name. It was introduced from California into Florida in 1930 by J. R. Watson, Entomologist of the Florida Experiment Station, and his assistants. However, when budget cutting began in 1931, the Experiment Station had to discontinue the work with the Mealybug Destroyer. Since then a private insectary in central Florida has taken up this work on a commercial scale.

The "Crypt" is about one-eighth inch long, has black wing-covers, brownish body and thorax.

Leis, a third imported ladybeetle, this time from China into California, is also known as the Chinese Ladybeetle. It was introduced into Florida from California by Prof. J. R. Watson and his assistants, in 1925. This beetle is among the largest of the ladybeetles, fully one-fourth inch long, buff in color with black spots. It is an aphid-eating species and was introduced to assist in the control of

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the Green Citrus Aphid which had swept the state.

At first it seemed doubtful whether the beetle would become established although colonies had been placed in many parts of the state. However, Prof. Watson finds that it has apparently established itself in several good-sized citrus properties in the central part of the state where, also according to Watson, when aphids are scarce, it feeds on the extra-floral nectaries of crotalaria and the pollen of the scrub palmetto. Prof.

Watson further notes that it appears to have an appreciable effect in keeping down the citrus aphid in these properties.

There are of course many native ladybeetles that feed on scale-insects, aphids and other soft-bodied insects. Many of these are described and figured in a Plant Board Bulletin, entitled "Ladybeetles of Florida," of which copies are still available. Extension Bulletin No. 67, Citrus Insects and Their Control, may also be consulted.

*Purple Scale*

## The Control Of Purple Scale And Rust Mites With Lime Sulphur Solution

(Concluded from last month)

In the majority of sprayed plots, better rust mite control was obtained where lime-sulfur, liquid or dry, was supplemented with either wettable sulfur or bentonite sulfur, than where only straight liquid lime-sulfur was used. Liquid lime-sulfur plus wettable sulfur had a lower percent of infested fields for the season than any of the other combinations. Comparing liquid lime-sulfur plus Kolo-fog and dry lime-sulfur plus Kolo-fog the results showed that these two combinations were about equal for rust mite control. Soda sulfur plus Kolo-fog gave very unsatisfactory results. The plot that received an oil emulsion after Bordeaux was dusted with sulfur dust five times, and the plot receiving no follow-up spray was dusted six times. The last application of spray was made August 6, which gave rust mite protection in the majority of plots until December 1. No accurate count of russet fruits was made, but there was less than 2 percent russet fruit in the lime-sulfur plus wettable sulfur and also in the lime-sulfur plus Kolo-fog plots, while an estimate of 30 to 40 per cent was in that grade in the dusted plots.

In a general review of the experiments conducted during the past five years our results show that purple scale was reduced after three applications of lime-sulfur whether the applications were made at intervals of two weeks, six weeks, or longer periods of time. Two applications of lime-sulfur following Bordeaux mix-

ture gave results comparable to one application of oil emulsion, and three applications of lime-sulfur following Bordeaux gave better results in most cases than one application of oil emulsion, especially when the first lime-sulfur spray was made during the first half of April. Lime-sulfur solution gave better purple scale and rust mite control when supplemented with some of the wettable sulfurs. The addition of one percent oil in a dormant Bordeaux spray did not give enough reduction in scale insects to warrant the use of that amount of oil, especially when the danger of cold and drought injury is considered. If an oil emulsion is desired as a spreader it is probably more economical to add just enough for that purpose and follow later with a scalecide. In the few tests that have been made with various copper compounds that do not leave any appreciable amount of residue better scale control was obtained with either lime-sulfur or oil when following those materials than when following Bordeaux mixture. Three lime-sulfur applications gave rust mite protection for periods ranging from seven to ten months with a very low percent of russet fruits.

It should be understood by those who expect to control scale insects with lime-sulfur that a good coverage is necessary on the under sides of the leaves and on the limbs. The more recent method employed by some growers of applying the lime-sulfur from a moving sprayer is very likely to give unsatisfactory results, especially if there is any degree of scale infestation. This is particularly

true when the trees have a dense covering of foliage and the lower limbs are near to the ground. The first mites usually found after an application of lime-sulfur were on fruits hanging near the ground and on the inside limbs of the tree. Individual trees vary greatly in the same grove, some having more or less foliage. If the spray machine is moving at same rate of speed when it passes densely foliated trees as when passing sparsely foliated trees, those trees with dense foliage will not only receive much less spray material per unit of area than the sparsely foliated ones but will have far less spray on the inside of the tree. Purple scale infest limbs and twigs as well as the leaves, so it is quite obvious why a good coverage is necessary. If there is a light infestation and most of the scale insects are on the leaves, then less material might be used. If the first two applications of lime-sulfur are thorough the third can probably be made with more speed and still obtain fairly good results.

This paper should be considered as a progress report. The results of experiments presented here show the general trend of tests conducted for periods of one to five years. In some of the individual experimental plots the degree of control was contradictory to the general results. Many factors enter into field experiments besides the materials used and the program followed. Drought, abnormally long rainy seasons, hurricanes and other uncontrollable factors may greatly effect the results from one year to another so that it is necessary to conduct the experiments over a period of years to be able to draw definite conclusions for any one material or program to be followed.

The fall garden should be started in August, suggests the State Agricultural Extension Service. Succession plantings should be made later.

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## CITRUS MARKETS

## 'ROUND THE WORLD

(Continued from page 19)

ment arrived in excellent condition.

The prospects for the sale of American oranges in the Netherlands are encouraging. Due to the extensive frost damage to the Spanish crop, the import season was ended early in May, or six weeks earlier than normal. By this time the season for Egyptian and Palestine oranges is also ended. The first shipments into the Netherlands consisted of navels, U. S. No. 1 grade. The only competition at this time of the year is from Brazil.

## Citrus Fruit Marketing Season

Isle of Pines, Cuba:

Grapefruit — August to October, heaviest in September.

Union of South Africa:

Grapefruit—April to September, heaviest in July and August,

Oranges — Navels, May to September, heaviest in June and July, Valencias, July to November, heaviest in August and September.

Italy:

Oranges — November to June, heaviest in February to April.

Palestine:

All citrus, November to April, Brazil:

Sao Paulo — Oranges — April to Sept., heaviest in May and June; Rio Janeiro — Oranges — June to Dec., heaviest in Sept. — Santos — April to July.

heaviest in December and January.

Paraguay:

Oranges — May to July.

Puerto Rico:

Grapefruit — year 'round, heaviest exports (a) Sept. and Oct. (b) March to June.

Jamaica:

Grapefruit — August to April, heaviest Oct. and Nov.

Trinidad:

Oranges and grapefruit — Oct. to April.

British Honduras:

Oranges — Sept. to Feb.

Grapefruit — Sept. to Dec. (Marsh variety) and Jan. to April (Duncan variety.)

Portugese East Africa:

Oranges — April and May (mid-season crop).

Grapefruit — April to July.

Spain:

Oranges — Nov. to June.

Australia:

Oranges — June to November, heaviest in July and August.

Argentina:

Grapefruit — June and July, Oranges — Probably same period, exports small.

## THE CITRUS INDUSTRY

## OBSERVATION OF THE CITRUS INDUSTRY IN TEXAS

(Continued from page 12.)

their properties from large development companies in tracts of from 5 acres up. The land with groves set and contracts to care for them for a specified time of five years usually, was sold until 1930 for about \$1000 per acre. There were sales much higher\* than that figure. Developed groves can now be bought as low as \$200 per acre. Growers are persistent and very optimistic as a class, had it not been for these qualities, there would be no citrus growers there, because those who have made a profit on the growing of citrus are

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THRIFTY TREES and budwood from record performance Perrine Lemon parents, Persian Lime and other citrus varieties. DeSoto Nurseries, DeSoto City, Fla.

CROTALARIA — New crop, high quality, double cleaned, scarified Crotalaria Striata seed for sale. Attractive prices. Carolinas' Crotalaria Co., Camden, S. C.

UP to \$20.00 paid for Indian Head Cents; Half Cents \$125.00; Large Copper Cents \$500.00, etc. Send dime for list. Romanocoinshop, D. Springfield, Mass.

WANTED: — Good second hand double orange sizer, which will run two cars. Christian & Neal, McIntosh, Fla.

Large citrus trees for replanting at special low price. Grafted avocado trees and budwood of Perrine lemon and Tahiti limes.

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Avon Park, Fla.

MEN WANTED—Sell Shirts. No experience necessary. Free samples. Commission in advance. Free ties with shirts. Carroll Mills, 875A Flatbush Av., Brooklyn N. Y.

POSITION WANTED — Managing, caring for citrus grove, for good, reliable party. Highest type reference gladly furnished. H. A. KUTER, Elkton, Fla.

August, 1935

hard to find, in fact they must have been on vacation, for we were unable to find the first one.

WANTED—To hear from owner of land for sale. O. Hawley, Baldwin, Wis.

FREE Booklet describes 87 plans for making \$20-\$100 weekly, home or office, business your own. Elite Service, 505 Fifth ave., New York City.

CLEOPATRA MANDARIN and Sour Orange rood stook. Also Hamlin, Valencia and Persian Lime budded trees. Grand Island Nurseries, Eustis, Fla.

WANTED—To hear from owner having good farm for sale. Cash price, particulars, John Black, Chippewa Falls, Wisconsin.

PUREBRED PULLETS FOR SALE—White Leghorns and Anconas ready to ship. Barred Rocks and R. I. Reds shortly. Several hundred yearling White Leghorn hens now laying 70%. Write or wire for prices. C. A. Norman, Dr. 1440, Knoxville, Tenn.

LAREDO SOY BEANS, considered free from nematode, excellent for hay and soil improvement. Write the Baldwin County Seed Growers Association, Loxley, Alabama, for prices.

FANCY ABAKKA pineapple plants. R. A. Saeger, Ankona, Florida.

FOR SALE—Selected budwood and trees of Perrine lemon, Tahiti lime, new varieties tangeloes and other citrus. Ward's Nursery, Avon Park, Fla.

DETAILED SOIL Analysis, Interpretations. \$2.50. Soil Laboratory, Frostproof, Florida.

SCENIC HIGHWAY NURSERIES has a large stock of early and late grapefruit and oranges. One, two and three year buds. This nursery has been operated since 1883 by G. H. Gibbons, Waverly, Fla.

NEW COMMERCIAL lemon for Florida, the Perrine; proven. All residents need yard trees, keeping Florida money at home. Booking orders for budded stock for Winter delivery. DeSoto Nurseries, DeSoto City, Fla.

SATSUMA BUDWOOD from Bearing Trees. Hills Fruit Farm, Panama City, Fla.

SEED—Rough lemon, sour orange, cleopatra. New crop from type true parent trees. Also thrifty seedlings. DeSoto Nurseries, De Soto City, Florida.

BUDDED trees new Florida commercial lemon, proven, thin skinned, juicy, scab immune. Also rough lemon, sour orange and Cleopatra seed and liningout seedlings. DeSoto Nurseries, DeSoto City, Fla.

SEEDS—ROUGH LEMON, SOUR ORANGE, CLEOPATRA. Pure, fresh, good germination. Also seedlings liningout size. De Soto Nurseries, DeSoto City, Fla.

CROTALARIA SPECTABILIS—Seed for sale. New crop, well cured, bright and clean. Price 25c per pound in 100 pound lots and over, 30c per pound in less quantities. F. O. B. Hastings, Bunnell, Lowell and San Antonio, Florida. F. M. LEONARD & COMPANY, Hastings, Florida.

WANTED—Position as packing house foreman; in citrus business twenty-five years; ten years' experience as foreman; married man. J. R. Henry, Okahumpka, Florida.

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# Acetylene Versus Ethylene For Degreening Citrus Fruit

BY J. R. WINSTON, SENIOR HORTICULTURIST

DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES, BUREAU OF PLANT INDUSTRY, UNITED STATES DEPARTMENT OF AGRICULTURE

If citrus fruits were sold on the basis of juice content and quality there would be no need for the coloring, washing, grading, polishing and other treatments given them during the packing operation, and every packer would be delighted. These treatments are expensive and add nothing to the food value of the commodity, but they are considered necessary because they improve the appearance of fruit and help to sell it. The visible quality or appearance of citrus fruits determines pretty much their sales appeal, which after all is sales value.

Every grower knows that appearance alone is not a dependable index to dessert quality because other factors such as weather conditions, varietal characteristics, etc., influence rind color. Color alone is often misleading but as the consuming public controls the purse strings, it must be satisfied. An immature orange cannot be made to appear mature by the ethylene treatment, but the appearance of fruit can be made to more nearly match its taste by the use of gas. It often happens that a superior fruit may have a greenish cast to the rind, and because of this superficial color the trade will not accept it, whereas an inferior fruit with more of the color that the consumer wants outsells the fruit of better quality. Consequently, shippers have for years been forced by consumer preference to do what they could to remove the green pigment from the rind by accelerating a natural process that causes the green rind color to disappear and thereby brings to view whatever shade of orange or yellow there may be in the rind. This degreening process has been adopted in all citrus producing areas that supply discriminating markets; it has but slight, if any, effect upon the acid and sugar content of the juice; it exerts little or no ripening effect upon the fruit; in fact it is an aid to nature in that it accomplishes in a few days a degree of degreen-

ing that requires weeks if the fruit is left on the tree even during cool weather that is favorable to coloring. It also is used on fruit that regreens during warm weather, although this does not normally occur if the fruit is left on the tree. The Valencia orange is a good illustration of a fruit that regreens while it ripens and approaches senility. Were it not for the greening treatment such a superior fruit would not attract the consumer as much when it is fully mature as it would earlier even before it reaches legal maturity.

The degreening treatment was started many years ago when the green color of the rind was sweated out in humid rooms—a slow process requiring weeks. Later it was learned that the fumes resulting from the incomplete combustion of kerosene quickly degreened citrus fruits; still later it was established that ethylene found in kerosene fumes and also in certain other gases would degreen fruit, and that kerosene fumes from which ethylene had been removed was incapable of doing so quickly. The use of kerosene fumes, which are essentially diluted ethylene, and later the use of concentrated commercially prepared ethylene became general and now both are widely used.

There are of course factors other than gas concentration that exert an equal if not greater influence on the rate of degreening, for example room temperature and the quality of the fruit itself; however, with the better equipped rooms the problem of sufficient heat has been largely overcome.

The gas is usually applied at rates far in excess of that necessary to cause the green coloring matter to fade. In addition to being present in effective proportions in kerosene fumes, ethylene also occurs in coal gas, water gas, acetylene, etc., any of which will destroy or dissipate chlorophyll, the green pigment with which this paper is directly concern-

ed.

The indiscriminate use of either kerosene fumes or ethylene is too often followed by heavy decay, mainly stem-end rot, the increase in spoilage often being roughly proportional with the amount of gas applied. Other factors such as length of exposure to the degreening agent and ventilation are well known to have influence on decay, but the use of the gas in excessive proportions is perhaps the main cause.

During the past few years the amount of gas used in degreening oranges and grapefruit has been reduced considerably and the damaging effects formerly encountered have generally been lessened. Even now much more gas than is good for the fruit is being used; in fact the minimum effective concentration has not been established, although it is known to be very low. Most people have an ingrained feeling that if a little is good, more is better—even in the case of gas for degreening purposes—and too often there is a tendency to attempt to speed up the process beyond its maximum limit by increasing, sometimes greatly so, the amount of gas used. This is often the case with coarse fruit and occasionally so when regreening oranges and grapefruit are being treated, since both are difficult to color at best.

Recognizing the tendency of packing house operators to use too much gas and bearing in mind that ethylene is the only known satisfactory degreening agent, it seemed possible to meet the situation by substituting for pure ethylene another gas that contains only a small amount of ethylene, such as city illuminating gas or acetylene, the latter being more readily available.

As already stated, it is unquestionably true that under favorable temperature conditions the maximum rate of degreening can be effected with much less gas than is now ordinarily

(Continued on page 7)



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